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TRANSMITTAL FORM

(to be used for all correspondence after initial filing)

Total Number of Pages in This Submission	27

Application Number	10/796,071
Filing Date	March 10, 2004
First Named Inventor	Richard L. SUTHERLAND, et al.
Art Unit	1756
Examiner Name	Angebranndt, M.
Attorney Docket Number	SAIC0006CON1

ENCLOSURES ***(check all that apply)***

- ☒ Fee Transmittal Form
  - ☐ Fee Attached
- ☐ Amendment / Reply
  - ☐ After Final
  - ☐ Affidavits/declaration(s)
- ☐ Extension of Time Request
- ☐ Express Abandonment Request
- ☐ Information Disclosure Statement
- ☐ Certified Copy of Priority Document(s)
- ☐ Reply to Missing Parts/ Incomplete Application
  - ☐ Reply to Missing Parts under 37 CFR1.52 or 1.53
- ☐ Drawing(s)
- ☐ Licensing-related Papers
- ☐ Petition
- ☐ Petition to Convert to a Provisional Application
- ☐ Power of Attorney, Revocation Change of Correspondence Address
- ☐ Terminal Disclaimer
- ☐ Request for Refund
- ☐ CD, Number of CD(s) ____
  - ☐ Landscape Table on CD
- ☐ After Allowance Communication to TC
- ☐ Appeal Communication to Board of Appeals and Interferences
- ☒ Appeal Communication to TC **(Appeal Notice, Brief, Reply Brief)**
- ☐ Proprietary Information
- ☐ Status Letter
- ☒ Other Enclosure(s) *(please identify below)*:
  Credit Card Payment Form

Remarks

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT

Firm	Kilpatrick Stockton LLP		
Signature	Reg. No. 48,449		
Printed Name	George T. Marcou		
Date	8/1/06	Reg. No.	33,014

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PTO/SB/17 (01-06)
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U.S. Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE

Fees pursuant to the Consolidated Appropriations Act, 2005 (H.R. 4818).

FEE TRANSMITTAL for FY 2006

☒ Applicant claims small entity status. See 37 CFR 1.27

TOTAL AMOUNT OF PAYMENT ($) 500

Complete if Known	
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FEE CALCULATION

1. BASIC FILING, SEARCH, AND EXAMINATION FEES

	FILING FEES		SEARCH FEES		EXAMINATION FEES		
		Small Entity		Small Entity		Small Entity	
Application Type	Fee ($)	Fee($)	Fee($)	Fee($)	Fee($)	Fee($)	Fees Paid ($)
Utility	300	150	500	250	200	100	____
Design	200	100	100	50	130	65	____
Plant	200	100	300	150	160	80	____
Reissue	300	150	500	250	600	300	____
Provisional	200	100	0	0	0	0	____

2. EXCESS CLAIM FEES

Fee Description	Fee ($)	Small Entity Fee ($)
Each claim over 20 (including Reissues)	50	25
Each independent claim over 3 (including Reissues)	200	100
Multiple dependent claims	360	180

Total Claims	Extra Claims	Fee($)	Fee Paid ($)
____ -20 or HP=	____	x ____	= ____

HP = highest number of total claims paid for, if greater than 20.

Indep. Claims	Extra Claims	Fee($)	Fee Paid ($)
____ - 3 or HP=	____	x ____	= ____

HP = highest number of independent claims paid for, if greater than 3.

Multiple Dependent Claims	
Fee ($)	Fee Paid ($)
____	____

3. APPLICATION SIZE FEE

If the specification and drawings exceed 100 sheets of paper (excluding electronically filed sequence or computer listings under 37 CFR 1.52(e)), the application size fee due is $250 ($125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).

Total Sheets	Extra Sheets	Number of each additional 50 or fraction thereof	Fee ($)	Fee Paid ($)
____ - 100 =	____	/ 50 = ____ (round up to a whole number) x	____ =	____

4. OTHER FEE(S)

	Fees Paid ($)
Non-English Specification, $130 fee (no small entity discount)	____
Other (e.g., late filing surcharge) : Appeal Brief Filing Fee	500

SUBMITTED BY

Signature	Reg. No. 48,499	Registration No. (Attorney/Agent) 33,014	Telephone 202 508 5800
Name (Print/Type)	George T. Marcou		Date 8/1/06

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of

Richard L. Sutherland, et al. Art Unit: 1756

Serial No. 10/796,071 Examiner: ANGEBRANNDT, M.

Filed: March 10, 2004

For: A SYSTEM AND METHOD FOR REPLICATING VOLUME HOLOGRAMS

APPEAL BRIEF

U.S. Patent and Trademark Office
Customer Window, Mail Stop **Appeal Brief - Patents**
Randolph Building
Alexandria, VA 22314

Sir:

This is an Appeal Brief under 37 C.F.R. § 41.37 in connection with the Final Office Action, Notice of Appeal and Notice of Panel Decision from Pre-Appeal Brief Review mailed July 3, 2006. Each of the topics required by Rule 41.37 is presented herewith and is labeled appropriately. This Appeal Brief is being submitted within 1 month from the mail date of the Notice of Panel Decision (See OG Notice 12 July 2005) and thus not fees are believe to be due.

(1) Real Party In Interest

The real party in interest is Science Applications International Corporation.

(2) Related Appeals And Interferences

Appellants are unaware of any related appeals or interferences.

(3) Status Of Claims

Claims 49-90 are pending in the present application. Claims 49-90 stand under final rejection, from which rejection this appeal is taken. Claims 1-48 were previously canceled.

(4) Status of Amendments

The claims have not been amended after the final Office Action dated March 7, 2006.

(5) Summary Of Claimed Subject Matter

This summary of claimed subject matter is a concise explanation of the subject matter defined in independent claims 49, 60, 70 and 80. This is merely meant to be a summary and is in no way intended to limit the pending claims. Since the specification of the pending application is substantively identical to parent United States Patent No. 6,730,442 ('442 Patent) to which the present application claims priority as a continuation, the undersigned is utilizing the Patent column and line numbers for ease of reference.

The text of Claims 49 and 70 is set forth below:

> 49. (Previously Presented) A system for duplicating a hologram comprising:
>
> a radiation source for emitting a coherent beam of radiation;
>
> a hologram having an electrically controllable variable diffraction efficiency; and a recording substrate comprised of a polymer-dispersed liquid crystal material for recording a replica of the hologram having an electrically controllable variable diffraction efficiency therein, wherein the hologram and the recording substrate are in optical contact with one another and are placed in a path of the coherent beam of radiation.
>
> 70. (Previously Presented) A method for duplicating a hologram comprising:
>
> directing a coherent radiation beam at a first optical component having a hologram with an electrically controllable variable diffraction efficiency recorded therein;
>
> diffracting a first portion of the coherent radiation beam via the hologram forming a diffracted radiation beam;
>
> transmitting a second portion of the coherent radiation beam through the first optical component forming a transmitted beam; and

interfering the diffracted radiation beam with the transmitted radiation beam within a second optical component to form a replica of the hologram having an electrically controllable variable diffraction efficiency therein.

Referring to Figure 3 of the '442 Patent and the description thereof in the specification at, *inter alia*, Column 13, lines 32-58, the subject matter of Claims 49 and 70 is concisely explained:

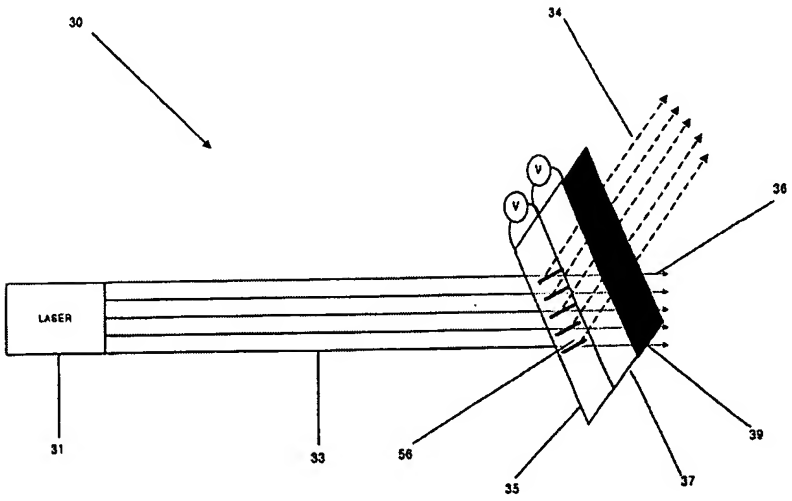

Figure 3

Referring once again to FIG. 3 a system 30 for reproducing a switchable transmission hologram from a master hologram 35 is shown. For recording a transmission hologram, the master hologram 35 is mounted in the path of an incident beam 33 at the Bragg angle. A PDLC blank 37 is optically contacted to the master hologram 35 at the same angle to form a master/blank assembly. Finally, an absorption filter 30 (e.g., neutral density) may optionally be placed behind the PDLC blank 37 in order to absorb extraneous radiation and avoid spurious reflections which may lead to the formation of unwanted interferograms within the PDLC blank 37. The master/blank assembly of master hologram 35, PDLC blank 37, and, optionally, absorption filter 30 is then illuminated using a single coherent incident beam 33 from radiation source 31.

Utilizing the hologram duplication system of FIG. 3, the radiation source 31 emits a coherent radiation beam 33 (e.g., laser) that is directed towards a first surface of the master hologram 35. Within master hologram 35, part of incident beam 33 is diffracted by the holographic grating 56, forming diffracted beam 34, and part of the incident beam 33 is transmitted undiffracted, forming transmitted beam 36. Both diffracted beam 34 and

transmitted beam 36 pass through the second surface of the master hologram 35 and into the optically contacted first surface of the PDLC blank 37. Within the PDLC blank 37, the transmitted beam 36 and the diffracted beam 34 interfere, forming a replica of holographic grating 56 therein.

The text of Claim 60 is set forth below:

60. (Previously Presented) A method for duplicating a hologram comprising:

directing a coherent incident radiation beam at a first optical component;

transmitting the coherent incident radiation beam through the first optical component forming a transmitted beam, to a second optical component having a hologram with an electrically controllable variable diffraction efficiency recorded therein; and

diffracting the transmitted beam via the hologram forming a diffracted radiation beam, wherein the coherent incident radiation beam and the diffracted beam interfere within the first optical component to form a replica of the hologram having an electrically controllable variable diffraction efficiency therein.

Referring to Figure 4 of the '442 Patent and the description thereof in the specification at, *inter alia*, Column 13, line 66 to Column 14, line 39, the subject matter of Claim 49 is concisely explained:

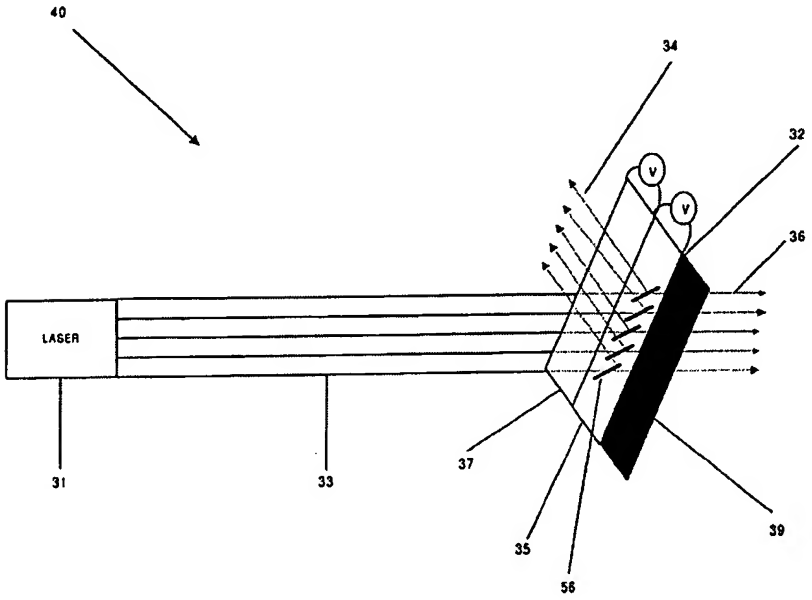

Figure 4

> Referring to FIG. 4, a system 40 for reproducing reflection holograms according to an embodiment of the present invention is shown. While similar to the transmission reproduction system 30 of FIG. 3, the reflection reproduction system 40 requires that PDLC blank 37 be located before the master hologram 35 within the optical path, followed by an absorption filter 39. As in FIG. 3, the PDLC blank 37, master hologram 35 and filter 39 configuration is oriented at the Bragg angle with respect to the coherent incident beam 33 from radiation source 31.
>
> Utilizing the hologram duplication system of FIG. 4, the radiation source 31 emits a coherent radiation beam 33 (e.g., laser) that is directed towards a first surface of the PDLC blank 37. The incident beam 33 is transmitted through the PDLC blank 37 as transmitted beam 36, passing through the second surface thereof and enters the first surface of the master hologram 35 which is optically contacted to the second surface of the PDLC blank 37. Within the master hologram 35, the incident beam 33 is diffracted by the holographic grating 56 located therein, creating diffracted beam 34. Transmitted beam 36 and diffracted beam 34 interfere within the PDLC blank 37 forming a replica of holographic grating 56 therein.

The text of Claim 80 is set forth below:

> 80. (Previously Presented) A system for duplicating a hologram comprising:
>
> a radiation source for emitting a coherent beam of radiation;
>
> a hologram having an electrically controllable variable diffraction efficiency; and
>
> a recording substrate comprised of a polymer-dispersed liquid crystal material for recording a replica of the hologram having an electrically controllable variable diffraction efficiency therein in a single step forming a photochemically cured polymer matrix, wherein the hologram and the recording substrate are in optical contact with one another and are placed in a path of the coherent beam of radiation; and
>
> further wherein polymer-dispersed liquid crystal material has an anisotropic spatial distribution of phase-separated liquid crystal droplets within the photochemically cured polymer matrix.

In combination with the citations above with respect to independent claims 49, 60 and 70, the '442 specification at, *inter alia*, Column 13, line 66 to Column 14, line 39, concisely explains the subject matter of Claim 80:

> The PDLC material employed in the practice of the present invention creates a switchable hologram in a single step. A new feature of a preferred PDLC material is that illumination by an inhomogeneous,

coherent light pattern initiates a patterned, anisotropic diffusion (or counter-diffusion) of polymerizable monomer and second phase material, particularly liquid crystal. Thus, alternating well-defined channels of second phase-rich material, separated by well-defined channels of nearly pure polymer, are produced in a single-step process.

A resulting preferred PDLC material has an anisotropic spatial distribution of phase-separated liquid crystal droplets within the photochemically cured polymer matrix. Conventional PDLC materials made by a single-step process can achieve at best only regions of larger liquid crystal droplets and smaller liquid crystal droplets in a polymer matrix. The large bubble sizes are highly scattering, producing a hazy appearance and multiple order diffractions, in contrast to the well-defined first order diffraction and zero order diffraction resulting from the small liquid crystal droplets of the preferred PDLC material in well-defined channels of liquid crystal-rich material. Reasonably well-defined alternately liquid crystal-rich channels and nearly pure polymer channels in a PDLC material are possible by multi-step processes, but such processes do not achieve the precise control of morphology over liquid crystal droplet size and distribution of size and width of the polymer and liquid crystal-rich channels made possible by a preferred PDLC material.

(6) Grounds of Rejection to be Reviewed on Appeal

A. Claims 49-90 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chang '045, in view of Ikeda et al. EP 0087281 and Sutherland et al. WO 98/04650, further in view of Margerum et al. '568 and Caulfield, et al. "The Applications of Holography";

B. Claims 49-90 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chang '045, in view of Ikeda et al. EP 0087281, Sutherland, et al. WO 98/04650, Caulfield, et al. further in view of Margerum et al. '568 and either Eguchi et al. JP 03-188479 or Wreede et al. '118;

C. Claims 49-90 are rejected under 35 U.S.C. 103(a) as being unpatentable over Caulfield, et al. and Sutherland et al. WO 98/04650, in view of Margerum et al. '568, Sturdevant '946 and Redfield '861.

(7) Argument

A. Rejection of Claims 49-90 under 35 U.S.C. 103(a) as being unpatentable over Chang '045, in view of Ikeda et al. EP 0087281 and Sutherland et al. WO 98/04650, further in view of Margerum et al. '568 and Caulfield, et al. "The Applications of Holography"

i. *Cited References Do Not Teach or Suggest at Least One Limitation*

The undersigned representative respectfully submits that the Office has failed to establish a *prima facie* case of obviousness since one of the required claim limitations is not taught or suggested by any of the cited references. To establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974).

Independent claims 49, 60, 70 and 80 include limitations to the replicating of a master electrically switchable hologram into a replica electrically switchable hologram by exposing the master electrically switchable hologram to a single beam. The single beam becomes two beams, a transmitted and a diffracted beam, by virtue of the holographic diffraction grating within the master electrically switchable hologram. The transmitted and diffracted beams interfere within the replica component to form a replica electrically switchable hologram. Importantly, **there is no cited reference that teaches using an**

electrically switchable hologram as a master to form any type of hologram, static or otherwise. The undersigned provides a chart below summarizing how the references cited do not teach or suggest the required limitation of all independent claims that the master have an electrically variable diffraction efficiency[1]:

	Independent CLAIM elements	**Chang '045**	**Ikeda (EP0087281)**	**Sutherland (WO98/04650)**	**Margerum '568**	**Caulfield**
Type of hologram recorded	Electrically Variable diffraction efficiency	STATIC – diffraction efficiency varies as move from center to edge; but not electrically controllable	STATIC	Electrically Variable diffraction efficiency	Electrically Variable diffraction efficiency	STATIC
Type of master hologram	**Electrically Variable diffraction efficiency**	**None**	**STATIC**	**None**	**None**	**STATIC**
Formed via contact copying	YES	NO	YES	NO	NO	YES

Specifically, according to well-established precedent, the Office bears the initial burden of factually supporting any *prima facie* conclusion of obviousness. Further, in order to establish a prima facie case of obviousness, three basic criteria must be met (See MPEP §2142):

(1) there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings;

(2) there must be a reasonable expectation of success; and

(3) the prior art reference (or references when combined) must teach or suggest all the claim limitations.

In this case, the Office has failed to meet requirement (3) as is clearly shown by the chart set forth above. To make up for the obvious deficiency, on page 6 of the Final Office Action, the Office attempts to argue that in Sutherland, utilizing a mirror to produce the

[1] Additional references cited including Eguchi, Wreede, Sturdevant and Redfield are not cited in the chart as their respective teachings are less relevant to the limitations at issue than the references provided in the chart.

second of the two interfering beams within the PDLC blank is the same as using a holographic master in a contact copying process. This is simply absurd. The mirror is not being duplicated in the PDLC blank and is not being used in a contact copying process. And the Office argues further on pages 7-8 that the mere recitation of a hologram having an electrically switchable diffraction efficiency in Sutherland somehow meets the limitation wherein such a hologram is used as a master hologram in a contact copying process because "holograms are diffractive articles, which inherently diffract light (when on)." The undersigned fails to see how this statement shows that Sutherland discloses uses using an electrically switchable hologram as a master hologram in a contact copying (or any copying) process. The electrically switchable holograms described in Sutherland are not formed using contact copying or a master hologram and they are not described as being used as master holograms - ever.

All references cited are limited to static holograms as the master hologram (see Chart above). Consequently, the undersigned submits that the Office has failed to meet the threshold requirements for establishing a *prima facie* case of unpatentability.

ii. *No Motivation to Combine the References Cited*

The undersigned wishes to make it clear that there is absolutely no concession that the Office has set met the requirement of providing a reference or references that teach each claim limitation. But, assuming, *arguendo*, that each required limitation is taught or suggested by at least one of the cited references, there is not motivation to combine the cited references. See In re Vaeck, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). The undersigned recognizes that the suggestion, teaching, or motivation to combine the relevant prior art teachings does not have to be found explicitly in the prior art, as

> the teaching, motivation, or suggestion may be implicit from the prior art as a whole, rather than expressly stated in the references. . . . The test for an implicit showing is what the combined teachings, knowledge of one of ordinary skill in the art, and the nature of the problem to be solved as a whole would have suggested to those of ordinary skill in the art.

In re Kotzab, 217 F.3d 1365, 1370 (Fed. Cir. 2000) (internal citations omitted).

> **However, rejections on obviousness grounds cannot be sustained by mere conclusory statements**; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness. See Lee, 277 F.3d at 1343-46; Rouffett, 149 F.3d at 1355-59. This requirement is as much rooted in the Administrative Procedure Act, which ensures due process and non-arbitrary decisionmaking, as it is in § 103. See id. at 1344-45.

In re Kahn, 441 F.3d. 977, 988, 78 U.S.P.Q.2d 1329 (Fed. Cir. 2006) (emphasis added). This motivation cannot come from the application itself. In re Vaeck, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). The Office does not cite to the references themselves for motivation and no "problem" has been identified.

With all due respect, the undersigned submits that the Office is using impermissible hindsight in rejecting the claims. Referring to controlling Federal Circuit case law,

> In making the assessment of differences, section 103 specifically requires consideration of the claimed invention "as a whole." Inventions typically are new combinations of existing principles or features. *Envtl. Designs, Ltd. v. Union Oil Co.*, 713 F.2d 693, 698 (Fed.Cir.1983) (noting that "virtually all [inventions] are combinations of old elements."). The "as a whole" instruction in title 35 prevents evaluation of the invention part by part. Without this important requirement, an obviousness assessment might break an invention into its component parts (A + B + C), then find a prior art reference containing A, another containing B, and another containing C, and on that basis alone declare the invention obvious. This form of hindsight reasoning, using the invention as a roadmap to find its prior art components, would discount the value of combining various existing features or principles in a new way to achieve a new result--often the very definition of invention.
>
> Section 103 precludes this hindsight discounting of the value of new combinations by requiring assessment of the invention as a whole. This court has provided further assurance of an "as a whole" assessment of the invention under § 103 by requiring a showing that an artisan of ordinary skill in the art at the time of invention, confronted by the same problems as the inventor and with no knowledge of the claimed invention, would select the various elements from the prior art and combine them in the claimed manner. In other words, the examiner or court must show some suggestion or motivation, before the invention itself, to make the new combination. *See In re Rouffet,* 149 F.3d 1350, 1355-56 (Fed.Cir.1998).

Ruiz v. AB Chance Company, 357 F.3d 1270, 1275 (Fed. Cir. 2004).

> It is impermissible, however, simply to engage in a hindsight reconstruction of the claimed invention, using the applicant's structure as a template and selecting elements from references to fill the gaps. Interconnect Planning, 774 F.2d at 1143, 227 USPQ at 551. The references themselves must provide some teaching whereby the applicant's combination would have been obvious.

In re Gorman, 933 F.2d 982, 18 U.S.P.Q.2d 1885 (Fed. Cir. 1991).

> The genius of invention is often a combination of known elements which in hindsight seems preordained. To prevent hindsight invalidation of patent claims, the law requires some "teaching, suggestion or reason" to combine cited references. Gambro Lundia AB v. Baxter Healthcare Corp., 110 F.3d 1573, 1579, 42 USPQ2d 1378, 1383 (Fed.Cir. 1997).

McGinley v. Franklin Sports, Inc., 262 F.3d 1339, 60 U.S.P.Q.2d 1001 (Fed. Cir. 2001). "Determination of obviousness cannot be based on the hindsight combination of components selectively culled from the prior art to fit the parameters of the patented invention." ATD Corp. v. Lydall, Inc., 159 F.3d 534, 546, 48 USPQ2d 1321, 1329 (Fed.Cir.1998). In this case, the undersigned respectively submits that the Office has done precisely what the Federal Circuit has warned against --- using the applicant's invention as a "blue print," the Office searched for references having the individual pieces and argued that the combination of the pieces would be obvious.

The Office has set forth numerous piecemeal conclusory opinions, with no support for these opinions identified in the prior art (explicit or implicit), examples of which are listed below. The undersigned submits that other than the underlying specification at issue, no other support for the following opinions has been provided. The Office makes numerous technological leaps based solely on personal beliefs, mixing and matching parts of the numerous references with no basis for such combinations provided for in the references themselves or the skill in the art at the time of the invention.

- "It would have been obvious to...use the PDLC holograms of Sutherland et al. WO98/04650 as the master transmission hologram and vary the diffraction efficiency of the holographic master based on the location of the edge faded holograms to obviate the need for diffusers or varying the angle of the beam as a function of the location of the laser beam used in the scanning copy process of Ikeda et al. ... ." 3/07/06 Final OA pg. 5.

QUESTION – Other than the Applicant's disclosure, where is the support in the combined teachings, knowledge of one of ordinary skill in the art, and the

nature of the problem to make these multiple technological leaps and substitutions? Further, using a hologram having an electrically variable diffraction efficiency as described in Sutherland in place of the diffuser in Chang or the step of varying the beam angle in Ikeda is not a combination which describes the claimed invention. Neither Sutherland nor Chang are concerned with the problem of copying a hologram. And Ikeda results in copies of static holograms.

- "The electrical control of the diffraction efficiency in a PDLC is clearly easier than moving a diffuser as taught by Change '045 or varying the incident angle of the replay beam aught by Ikeda et al. EP 0087281 to generate the areas of reduced diffraction efficiency." 3/07/06 Final OA pg. 6.

QUESTION – Other than the Applicant's disclosure, where is the support in the combined teachings, knowledge of one of ordinary skill in the art, and the nature of the problem to make these multiple technological leaps and substitutions?

- "In the case of Chang '045, interference pattern formation is prevented at the edges by rendering the percentage of exposure less coherent in these areas which is the same effect achieved by reducing the diffraction efficiency of the grating when exposure of the edge regions occurs as more of the light merely passes through the hologram when the diffraction efficiency is reduced and by further replacing the holographic recording material of Ikeda et al. 00872181 or Chang '045 with a PDLC holographic recording material to produce a switchable hologram with faded edges so that it could be turned off when it was not desired to be in the drivers view and processing without the need for wet development." 3/07/06 Final OA pg. 7.

QUESTION – Other than the Applicant's disclosure, where is the support in the combined teachings, knowledge of one of ordinary skill in the art, and the nature of the problem to make these multiple technological leaps and substitutions? Further, replacing the recording material of Ikeda or Chang does not result in the claimed invention. Ikeda does not utilize an electrically switchable master and, as stated above, Chang has nothing to do with copy of holograms.

- **"The formation of edge-faded holograms requires both interferometric exposure and non-interferometric exposure. In the prior art, this may be achieved while using a laser for both exposures by the use of a diffuser placed in the beam path (Chang '045), adjusting the angle of the replay/reconstruction beam (Ikeda et al. EP 0087281) or not turning the PDLC hologram on (Sutherland et al. WO98/04650), leaving the beam undiffracted which is equivalent to the fixation exposure of Redfield '861.** Of

> these, clearly the easiest is modulating the PDLC material, which provides incentive to use a PDLC material as the diffractive master and more easily enable the edge diffracted PDLC hologram to be formed." See Office Action Page 8.[2]

QUESTION – Other than the Applicant's disclosure, where is the support in the combined teachings, knowledge of one of ordinary skill in the art, and the nature of the problem to make these multiple technological leaps and substitutions?

- "The position of the examiner is that using a holograms [sp?], such as the electrically switchable holograms of Sutherland et al. WO 98/04650 as the master would allow control of the diffraction efficiency of the replica/copy by direct control of the diffraction efficiency of the master being copied as the beam is scanned across the surface, rather than controlling the incident angle of the replay/copy beam as taught by Ikeda et al. EP0087281." See 3/07/06 Final OA Page 10.

QUESTION – Other than the Applicant's disclosure, where is the support in the combined teachings, knowledge of one of ordinary skill in the art, and the nature of the problem to make these multiple technological leaps and substitutions?

Importantly, with respect to this last opinion, there is no teaching, other than in the current specification, that describes using the electrically switchable holograms of Sutherland et al. WO 98/04650 as the master and further, as shown in the chart above, Ikeda results in the formation of a static hologram from a static master. Thus, even if we accept this position/opinion of the Examiner, **it does not describe the claimed invention**.

Further, these are merely conclusory opinions which do not meet the Office's burden to provide motivation or suggestion to combine the cited references. The Federal Circuit recently held in In re Beasley[3],

> The statements made by the Examiner, upon which the Board relied, amount to no more than conclusory statements of generalized advantages and convenient assumptions about skilled artisans. At least under the MPEP then in effect, such statements and assumptions are inadequate to support a finding of motivation, which is a factual question that cannot be

[2] The undersigned must make it clear, for the record, that neither Ikeda nor Sutherland describe the formation of edge-faded holograms using the methods of adjusting the angle of the replay/reconstruction beam or not turning on the PDLC hologram as is implied by the Office (See **bold** portions above). The only part of the **bolded** statement that his actually taught by a cited reference is the statement regarding Chang '045.

[3] In re Beasley, No. 04-1225, 117 Fed. Appx. 739, 743-44 (Fed. Cir. Dec. 7, 2004).

> resolved on "subjective belief and unknown authority." Lee, 277 F.3d at 1344. Under such circumstances, with respect to core factual findings, "the Board must point to some concrete evidence in the record in support" of them, rather than relying on its assessment of what is "well recognized" or what a skilled artisan would be "well aware." In re Zurko, 258 F.3d 1379, 1385-86 (Fed. Cir. 2001).

Accordingly, even assuming, *arguendo*, that each of the limitations of the claims is taught or suggested by at least one cited reference (**which the undersigned does not concede**), the necessary motivation to combine the references has not been provided. No number of emphatic conclusions regarding what the Examiner (who is not presumed to be skilled in the art) believes can take the place of the required support from the combined teachings, knowledge of one of ordinary skill in the art, and the nature of the problem.

Simply stated, the Office argues using a combination of 5 references (that do not even cover the claimed limitations as shown above) that it would be obvious to start with a primary reference that describes a dual beam, non-contact copying method to form a **static** hologram having **static**, varying, areas of diffraction efficiency and end up with a single beam contact copying process that uses an electrically controllable variable diffraction efficiency master hologram to form a replica hologram also having an electrically controllable variable diffraction efficiency. The Office focuses much attention on the technical teachings of the individual references and offers numerous personal and conclusory opinions, but ultimately, (1) there is no reference that teaches **using an electrically switchable hologram as a master to form any type of hologram, static or otherwise, through contact copying** and (2) the motivation to combine the individual teachings is simply not shown.

The undersigned respectfully maintains that claims 49-90 are allowable over this combination of references since the Office has failed to establish a *prima facie* case of unpatentability. In view of the remarks stated above, the undersigned representative respectfully requests that the Board request that the rejections of claims 49-90 be withdrawn and a notice of allowance extended.

B. **Claims 49-90 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chang '045, in view of Ikeda et al. EP 0087281, Sutherland, et al. WO 98/04650, Margerum et al. '568 and Caulfield et al., further in view of Eguchi et al. JP 03-188479 and Wreede et al. '118**

The undersigned incorporates the arguments set forth above in section A. The additional references cited in this rejection are Eguchi et al. JP 03-188479 and Wreede et al. Neither Eguchi et al. JP 03-188479 nor Wreede et al. cure the limitation or motivation deficiencies of the other five (5) references as described in section A. Specifically, both Eguchi et al. and Wreede et al. are cited for teaching contact copying of a reflection hologram where the incident beam passes through the recording medium and is diffracted to form a second beam by the underlying reflection medium, wherein the incident beam and the second beam interfere in the recording medium to duplicate the reflection hologram. Neither Eguchi et al. or Wreede et al. teach or suggest such a recording scenario wherein the reflection hologram has a variable diffraction efficiency.

Consequently, there can be no teaching of the formation of a replica reflection hologram having a variable diffraction efficiency using single beam contact copying with a variable diffraction efficiency master. The combination of Chang '045, in view of Ikeda et al. EP 0087281 and Sutherland, et al. WO 98/04650, Margerum et al. '568, Caulfield et al. and Eguchi et al. JP 03-188479 and Wreede et al. '118 clearly does not teach or suggest a system or method which includes a hologram(s) used as a master hologram(s) for contact printing a replica(s) thereof, wherein the replica(s) and hologram(s) has an electrically controllable variable diffraction efficiency as set forth in independent claims.

The undersigned respectfully maintains that claims 49-90 are allowable over this combination of references since the Office has failed to establish a *prima facie* case of unpatentability. In view of the remarks stated above, the undersigned representative respectfully requests that the Board request that the rejections of claims 49-90 be withdrawn and a notice of allowance extended.

C. **Claims 49-90 are rejected under 35 U.S.C. 103(a) as being unpatentable over Caulfield et al. and Sutherland et al. WO 98/04650, further in view of Margerum et al. '568, Sturdevant '946, and Redfield '861**

The undersigned incorporates the arguments set forth above in section A. The undersigned notes that this rejection does not even include references which the Office

has relied on in an attempt to establish a *prima facie* case of obviousness for the same claims, i.e., 49-90, in rejections A and B. The additional references cited in this rejection are Sturdevant '946 and Redfield '861. Neither Sturdevant '946 nor Redfield '861 cure the limitation or motivation deficiencies of the other three (3) references as described in section A. Sturdevant is cited by the Office as teaching:

> "a continuous process where the holographic recording medium is preexposed without any pattern using UV light (21), Then the hologram is exposed using a laser and contact exposure through a holographic master (85) and then post exposed using a UV lamp (91)."

The Examiner cites Redfield as teaching a precure for depleting oxygen and reducing the induction period; carrying out the fixation exposure using a reference beam; and the use of spatial light modulators. These references were cited for their alleged teachings of limitations that are no longer recited in the pending claims. As such, the teachings do not cure the deficiencies of the previously cited references with respect to the pending claims. The combination of Caulfield et al., Sutherland, Margerum '568, Sturdevant '946 and Redfield '861 clearly does not teach or suggest a system or method which include a hologram(s) (reflection or otherwise) used as a master hologram(s) for contact printing a replica(s) thereof, wherein the replica(s) and hologram(s) has an electrically controllable variable diffraction efficiency as set forth in independent claims. The undersigned maintains that this combination of references also fails to teach or suggest at least using an electrically switchable hologram as a master to form any type of hologram, static or otherwise, through contact copying.

The undersigned respectfully maintains that claims 49-90 are allowable over this combination of references since the Office has failed to establish a *prima facie* case of unpatentability. In view of the remarks stated above, the undersigned representative respectfully requests that the Board find that the rejections of claims 49-90 should be withdrawn and a notice of allowance extended.

(8) Claims Appendix

See Claims Appendix below.

(9) Evidence Appendix

None.

(10) Related Proceedings Appendix

None.

Respectfully submitted,

Date: 7/31/06

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Appendix of CLAIMS

1-48. (Cancelled).

49. (Previously Presented) A system for duplicating a hologram comprising:

a radiation source for emitting a coherent beam of radiation;

a hologram having an electrically controllable variable diffraction efficiency; and

a recording substrate comprised of a polymer-dispersed liquid crystal material for recording a replica of the hologram having an electrically controllable variable diffraction efficiency therein, wherein the hologram and the recording substrate are in optical contact with one another and are placed in a path of the coherent beam of radiation.

50. (Previously Presented) The system according to claim 49, wherein the polymer-dispersed liquid crystal material is comprised of:

(a) a polymerizable monomer comprising at least one acrylate;

(b) at least one type of liquid crystal material;

(c) a chain-extending monomer;

(d) a coinitiator; and

(e) a photoinitiator.

51. (Previously Presented) The system according to Claim 50, wherein the polymerizable monomer comprises a mixture of di-, tri-, tetra-, and penta-acrylates

52. (Previously Presented) The system according to Claim 50, wherein the polymerizable monomer is at least one acrylate selected from the group consisting of triethyleneglycol diacrylate, trimethylolpropane triacrylate, pentaerythritol triacrylate, pentaerythritol tetracrylate, and dipentaerythritol penta-acrylate.

53. (Previously Presented) The system according to Claim 50, wherein the polymerizable monomer comprises a mixture of tri- and penta-acrylates.

54. (Previously Presented) The system according to Claim 50, wherein the polymerizable monomer comprises dipentaerythritol pentaacrylate.

55. (Previously Presented) The system according to Claim 49, wherein the polymer-dispersed liquid crystal material further comprises a surfactant.

56. (Previously Presented) The system according to Claim 55, wherein the surfactant is octanoic acid.

57. (Previously Presented) The system according to Claim 50, wherein the polymerizable monomer comprises dipentaerythritol pentaacrylate, the at least one liquid crystal material comprises a mixture of cyanobiphenyls, the chain-extending monomer is N-vinyl pyrrolidone, the coinitiator is N-phenylglycine, and the photoinitiator is rose bengal.

58. (Previously Presented) The system according to claim 49, wherein the radiation source is a laser.

59. (Previously Presented) The system according to claim 49, wherein a diffraction efficiency of the hologram is continuously variable.

60. (Previously Presented) A method for duplicating a hologram comprising:

directing a coherent incident radiation beam at a first optical component;

transmitting the coherent incident radiation beam through the first optical component forming a transmitted beam, to a second optical component having a hologram with an electrically controllable variable diffraction efficiency recorded therein; and

diffracting the transmitted beam via the hologram forming a diffracted radiation beam, wherein the coherent incident radiation beam and the diffracted beam interfere within the first optical component to form a replica of the hologram having an electrically controllable variable diffraction efficiency therein.

61. (Previously Presented) The method for duplicating a hologram according to claim 60, wherein the first optical component is comprised of a polymer-dispersed liquid crystal material.

62. (Previously Presented) The method according to claim 61, wherein the polymer-dispersed liquid crystal material is comprised of:

(a) a polymerizable monomer comprising at least one acrylate;

(b) at least one type of liquid crystal material;

(c) a chain-extending monomer;

(d) a coinitiator; and

(e) a photoinitiator.

63. (Previously Presented) The method according to Claim 62, wherein the polymerizable monomer comprises a mixture of di-, tri-, tetra-, and penta-acrylates.

64. (Previously Presented) The method according to Claim 62, wherein the polymerizable monomer is at least one acrylate selected from the group consisting of triethyleneglycol diacrylate, trimethylolpropane triacrylate, pentaerythritol triacrylate, pentaerythritol tetracrylate, and dipentaerythritol penta-acrylate.

65. (Previously Presented) The method according to Claim 62, wherein the polymerizable monomer comprises a mixture of tri- and pentaacrylates.

66. (Previously Presented) The method according to Claim 62, wherein the polymerizable monomer comprises dipentaerythritol pentaacrylate.

67. (Previously Presented) The method according to Claim 62, wherein the polymer-dispersed liquid crystal material further comprises a surfactant.

68. (Previously Presented) The method according to Claim 67, wherein the surfactant is octanoic acid.

69. (Previously Presented) The method according to Claim 62, wherein the polymerizable monomer comprises dipentaerythritol pentaacrylate, the at least one liquid crystal material comprises a mixture of cyanobiphenyls, the chain-extending monomer is N-vinyl pyrrolidone, the coinitiator is N-phenylglycine, and the photoinitiator is rose bengal.

70. (Previously Presented) A method for duplicating a hologram comprising:

directing a coherent radiation beam at a first optical component having a hologram with an electrically controllable variable diffraction efficiency recorded therein;

diffracting a first portion of the coherent radiation beam via the hologram forming a diffracted radiation beam;

transmitting a second portion of the coherent radiation beam through the first optical component forming a transmitted beam; and

interfering the diffracted radiation beam with the transmitted radiation beam within a second optical component to form a replica of the hologram having an electrically controllable variable diffraction efficiency therein.

71. (Previously Presented) The method for duplicating a hologram according to claim 70, wherein the second optical component is comprised of a polymer-dispersed liquid crystal material.

72. (Previously Presented) The method according to claim 71, wherein the polymer-dispersed liquid crystal material is comprised of:

(a) a polymerizable monomer comprising at least one acrylate;

(b) at least one type of liquid crystal material;

(c) a chain-extending monomer;

(d) a coinitiator; and

(e) a photoinitiator.

73. (Previously Presented) The method according to Claim 72, wherein the polymerizable monomer comprises a mixture of di-, tri-, tetra-, and penta-acrylates.

74. (Previously Presented) The method according to Claim 72, wherein the polymerizable monomer is at least one acrylate selected from the group consisting of triethyleneglycol diacrylate, trimethylolpropane triacrylate, pentaerythritol triacrylate, pentaerythritol tetracrylate, and dipentaerythritol pentaacrylate.

75. (Previously Presented) The method according to Claim 72, wherein the polymerizable monomer comprises a mixture of tri- and penta-acrylates.

76. (Previously Presented) The method according to Claim 72, wherein the polymerizable monomer comprises dipentaerythritol pentaacrylate.

77. (Previously Presented) The method according to Claim 72, wherein the polymer-dispersed liquid crystal material further comprises a surfactant.

78. (Previously Presented) The method according to Claim 77, wherein the surfactant is octanoic acid.

79. (Previously Presented) The method according to Claim 72, wherein the polymerizable monomer comprises dipentaerythritol pentaacrylate, the at least one liquid crystal material comprises a mixture of cyanobiphenyls, the chain-extending monomer is N-vinyl pyrrolidone, the coinitiator is N-phenylglycine, and the photoinitiator is rose bengal.

80. (Previously Presented) A system for duplicating a hologram comprising:

a radiation source for emitting a coherent beam of radiation;

a hologram having an electrically controllable variable diffraction efficiency; and

a recording substrate comprised of a polymer-dispersed liquid crystal material for recording a replica of the hologram having an electrically controllable variable diffraction efficiency therein in a single step forming a photochemically cured polymer matrix, wherein the hologram and the recording substrate are in optical contact with one another and are placed in a path of the coherent beam of radiation; and

further wherein polymer-dispersed liquid crystal material has an anisotropic spatial distribution of phase-separated liquid crystal droplets within the photochemically cured polymer matrix.

81. (Previously Presented) The system according to claim 80, wherein the polymer-dispersed liquid crystal material is comprised of:

(a) a polymerizable monomer comprising at least one acrylate;

(b) at least one type of liquid crystal material;

(c) a chain-extending monomer;

(d) a coinitiator; and

(e) a photoinitiator.

82. (Previously Presented) The system according to Claim 81, wherein the polymerizable monomer comprises a mixture of di-, tri-, tetra-, and penta-acrylates.

83. (Previously Presented) The system according to Claim 81, wherein the polymerizable monomer is at least one acrylate selected from the group consisting of triethyleneglycol diacrylate, trimethylolpropane triacrylate, pentaerythritol triacrylate, pentaerythritol tetracrylate, and dipentaerythritol penta-acrylate.

84. (Previously Presented) The system according to Claim 81, wherein the polymerizable monomer comprises a mixture of tri- and penta-acrylates.

85. (Previously Presented) The system according to Claim 81, wherein the polymerizable monomer comprises dipentaerythritol pentaacrylate.

86. (Previously Presented) The system according to Claim 80, wherein the polymer-dispersed liquid crystal material further comprises a surfactant.

87. (Previously Presented) The system according to Claim 86, wherein the surfactant is octanoic acid.

88. (Previously Presented) The system according to Claim 81, wherein the polymerizable monomer comprises dipentaerythritol pentaacrylate, the at least one liquid crystal material comprises a mixture of cyanobiphenyls, the chain-extending monomer is N-vinyl pyrrolidone, the coinitiator is N-phenylglycine, and the photoinitiator is rose bengal.

89. (Previously Presented) The system according to claim 80, wherein the radiation source is a laser.

90. (Previously Presented) The system according to claim 80, wherein a diffraction efficiency of the hologram is continuously variable.